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The Post-Embryonic Instars of a New Species of *Mydopholeus* (Acari:Astigmata:Rosensteiniidae)

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Abstract--A new species of Rosensteiniidae, *Mydopholeus wrenni*, is established based on specimens collected from bat guano in an Oklahoma cave. All post-embryonic instars are described. The genus *Guanophagoides* Fain and Flechtmann is synonymized with *Mydopholeus* McDaniel and Baker.

Introduction

In 1962 McDaniel and Baker described a new genus and species of Rosensteiniidae, *Mydopholeus capillus*, collected in Jalisco, Mexico. The present paper describes a new species of this genus which was collected in Oklahoma, U.S.A.

Mydopholeus wrenni new species

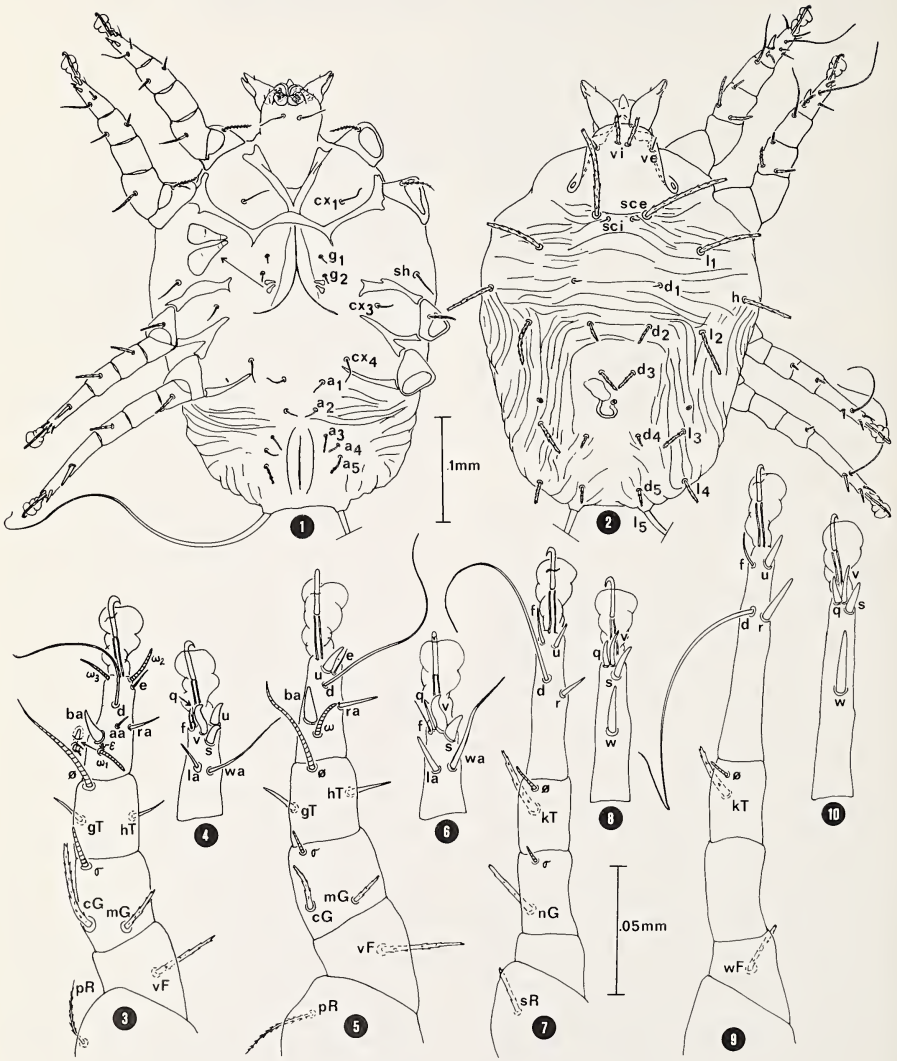
Relative positions of setae and other structures as indicated in figures. All measurements in micrometers with the mean given first and followed by the range in parentheses.

Description of Female (Figs. 1-2) (n = 6). Idiosomal length 367 (324-401); width at level of seta *sh* 271 (246-306). Idiosoma oval in outline, broadest anteriorly and narrowing posteriorly. Propodosoma and hysterosoma not divided by sejugal furrow. Dorsal surface striated with the exception of propodosomal region anterior to setae *sc e* (propodosomal shield), and the region anterior to and surrounding setae d_3 and extending to setae d_5 (on some specimens, a few striations occur between setae d_4 and d_5). Striations extending to ventral surface posterior to legs IV. Dorsum with 15 pairs of setae: *v i* 29 (24-32), *v e* 10 (8-12), *sc e* 82 (70-92), *sc i* 8 (4-10), *h* 46 (40-49), l_1 54 (49-58), l_2 36 (29-47), l_3 25 (19-29), l_4 22 (16-25), l_5 392 (332-430), d_1 8 (5-10), d_2 17 (12-19), d_3 21 (19-24), d_4 11 (9-15), d_5 18 (17-20). With the exception of setae *v e*, *sc i*, d_1 and l_5, all dorsal setae cylindrical with barbs (pectinations) along their lengths. Setae *v e*, *sc i*, and d_1 short and hairlike, and setae l_5 long and whiplike (barbs lacking on both d_2 setae of one specimen, both d_4 setae of one specimen, one d_4 seta of four specimens, and one d_5 seta of one specimen; setae *v e* occasionally bifurcate at tip). Supra-coxal setae absent. Opening of bursa copulatrix dorsal and located centrally between setae d_3 and d_4. Venter of idiosoma with 11 pairs of setae: *sh* 21 (18-23), cx_1 25 (19-30), cx_3 21 (15-25), cx_4 49 (38-52), g_1 10 (8-13), g_2 10 (7-13), a_1 12 (10-16), a_2 12 (10-14), a_3 13 (11-15), a_4 11 (9-13), and a_5 16 (13-19). All setae hairlike with the exception of *sh* which is somewhat stouter and a_5 which is pectinate (a_3 also pectinate on two specimens). Apodemes of legs I fused to form a "V", the base of which is fused to the epigynum. Apodemes of legs II unite with epigynum. Oviporus a sharply pointed inverted "V" extending between coxal fields II and III. Genital acetabula small, narrow, and tapering toward tip. Anus a longitudinal slit with lobes on each side, and located on posterior margin of idiosoma.

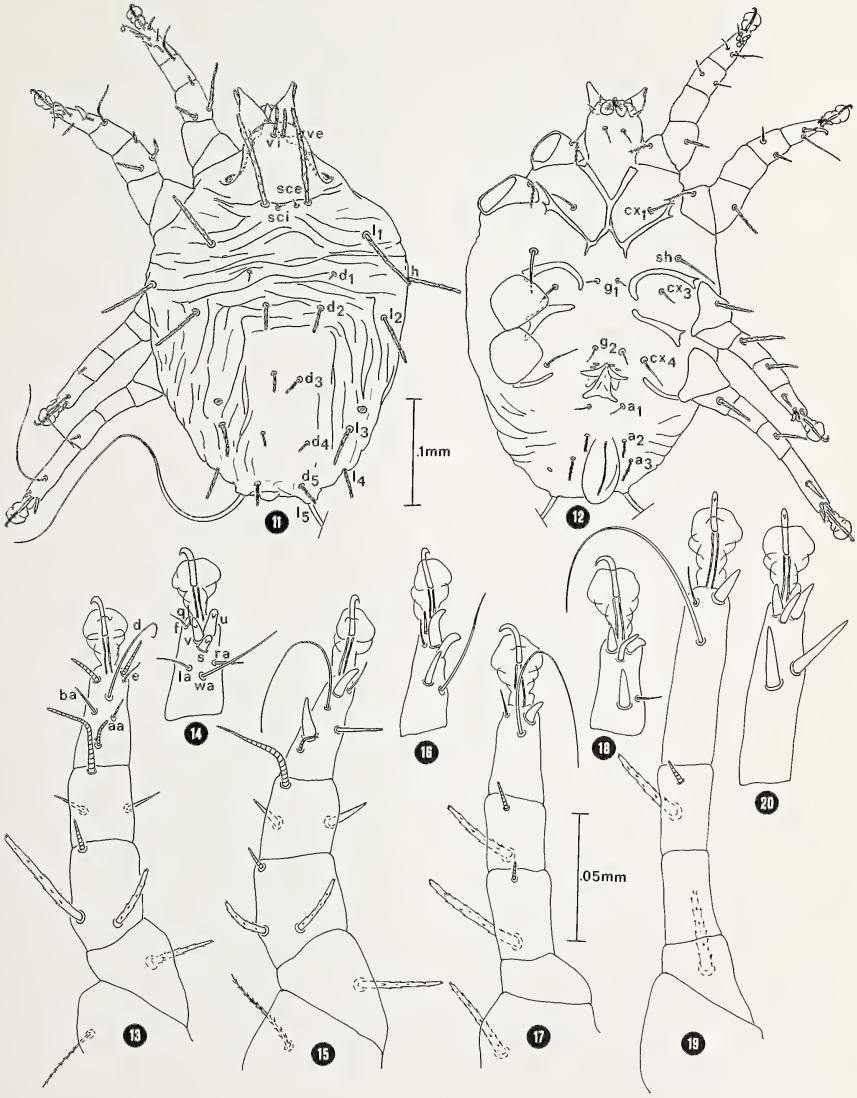
Leg I (Figs. 3-4) with trochanter bearing a thin pectinate seta (*pR*). Femur I with a cylindriform seta (*vF*) bearing small barbs along its length. Genu I with a single solenidion (σ) and two cylindriform setae (*mG* and *cG*), bearing small barbs. Tibia with a long solenidion (ϕ) and two spinelike setae (*gT* and *hT*). Tarsus with twelve setae and three solenidia. Solenidion ω_1 arising dorsally about one fourth of the way up from the base, and solenidia ω_2 and ω_3 both arising from distal end of tarsus. Famulus (ε) small and inserted in a depression in front of ω_1. Seta *ba* a stout spine located in front of famulus. Setae *s*, *v* and *u* clawlike and located ventrally and distally. All other setae simple and filiform. Seta *p* absent. Leg II (Figs. 5-6) similar to leg I except tarsus with eleven setae (seta *aa* absent) and seta *u* located dorsally instead of ventrally. Leg III (Figs. 7-8) with maximal setal compliment except for absence of tarsal setae *e* and *p*. Setae *sR*, *nG* and *kT* cylindrical and barbed. Leg IV (Figs. 9-10) with maximal setal compliment except for absence of tarsal setae *e* and *p*. Setae *wF* and *kT* cylindrical and barbed. Legs I and II stouter than III and IV. Legs I, II and III of approximately the same length, but leg IV longer than others, primarily due to a long, slender tarsus.

Subcapitulum (Fig. 21) and chelicerae (Fig. 22) similar to that found in *M. Capillus*. Venter of subcapitulum with a pair of flattened, veined, almost round pseudorutellar processes. Dorsal subcapitular setae (*cd*) short, stout and blunt. A pair of canals run from the podocephalic region through the subcapitulum and appear to empty into the mouth or cibarium.

Description of Male (Figs. 11-12) (n = 5). Idiosomal length 367 (349-391); width at level of seta *sh* 242 (232-257). Similar in idiosomal shape, dorsal setal pattern and dorsal striation pattern to female. Fifteen pairs of dorsal setae: *v i* 22 (21-24), *v e* 8 (7-11), *sc e* 83 (57-91), *sc i* 6 (4-7), *h* 64 (57-85), l_1 68 (64-78), l_2 50 (38-63), l_3 30 (22-39), l_4 26 (21-28), l_5 367 (363-377), d_1 6 (6-7), d_2 17 (14-21), d_3 18 (15-21), d_4 9 (8-11) and d_5 21 (18-23). Setae similar in shape and pectinations to



FIGS. 1-10. *Mydopholeus wrenni* female: 1) ventral view, 2) dorsal view, 3) leg I postaxial view, 4) tarsus I preaxial view, 5) leg II postaxial view, 6) tarsus II preaxial view, 7) leg III postaxial view, 8) tarsus III preaxial view, 9) leg IV postaxial view, 10) tarsus IV preaxial view.



FIGS. 11-20. *Mydopholeus wrenni* male: 11) dorsal view, 12) ventral view, 13) leg I postaxial view, 14) tarsus I preaxial view, 15) leg II postaxial view, 16) tarsus II preaxial view, 17) leg III postaxial view, 18) tarsus III preaxial view, 19) leg IV postaxial view, 20) tarsus IV preaxial view.

those of female. Pectination of setae d_4 variable (three specimens with pectinations only at tip, and one specimen lacking pectinations). Chelicerae and subcapitulum similar to female.

Venter of idiosoma with nine pairs of setae: *sh* 44 (38-50), cx_1 34 (30-39), cx_3 24 (21-28), cx_4 61 (51-74), g_1 10 (9-13), g_2 11 (9-13), a_1 14 (11-16), a_2 17 (14-21) and a_3 17 (12-21). Coxal setae and setae *sh* spinelike, a_2 and a_3 thin and pectinate, and others hairlike (a_2 not pectinate on two specimens and a_3 not pectinate on one specimen). Apodemes of legs I fuse to form a "Y-shaped" sternum. Apodemes of legs II join at midline and are in turn fused to base of sternum. Genital apparatus between coxal fields IV. Genital acetabula and anus similar in appearance to female.

Legs (Figs. 13-20) similar in appearance to female except slightly stouter and with many setae being stouter and larger. Seta *ba* of tarsus I simple and filiform, not a stout spine as in female. Chaetotaxy and solenidiotaxy similar to female.

Description of Larva (Figs. 23-24) (n = 1). Idiosomal length 189; width at level of seta *sh* 154. Idiosoma ovoid, but cleft posterior to anus. Pattern of dorsal striations similar to adult, except longitudinal striations also present centrally at posterior of idiosoma. Dorsum bearing twelve pairs of setae: *v i* 8, *v e* 5, *sc e* 21, *sc i* 3, *h* 9, 1_1 9, 1_2 8, 1_3 5, d_1 3, d_2 5, d_3 5 and d_4 5. Setae similar in appearance to female except d_2, d_3, d_4, 1_2, 1_3 and *h* not pectinate. Setae *h* with slight bifurcation at tip. Venter bearing four pairs of setae: *sh* 8, cx_1 12, cx_3 12 and *a* 6. Apodemes of legs I unite to form a "V-shaped" sternum; apodemes II and III free. Claparede organs absent from coxal fields I. Leg chaetotaxy and solenidiotaxy similar to female except trochanteral setae and tarsal solenidia ω_2 and ω_3 absent.

Description of Protonymph (Figs. 25-26) (n = 3). Idiosomal length 241 (200-265); width at level of seta *sh* 188 (159-203). Idiosoma ovoid with dorsal striations similar to larva. Dorsum bearing 15 pairs of setae: *v i* 9 (7-12), *v e* 6 (4-7), *sc e* 43 (37-50), *sc i 4 (4-4), h* 13 (13-18), 1_1 25 (20-27), 1_2 11 (9-13), 1_3 7 (6-7), 1_4 6 (6-7), 1_5 148 (142-156), d_1 4 (4-5), d_2 5 (4-6), d_3 5 (4-6), d_4 4 (4-5) and d_5 5 (5-6). Setae similar in appearance to female with the exception that setae d_2, d_3, d_4, d_5, 1_3 and 1_4 not pectinate (both 1_2 setae not pectinate on one specimen, and pectinate on only one of pair on two specimens; setae *h* with bifurcation at tip on two specimens). Venter bearing seven pairs of setae: *sh* 9 (6-12), cx_1 14 (11-18), cx_3 12 (9-14), *g* 7 (7-8), upper anal setae 7 (6-8), middle and lower anal setae 6 (5-6). No anal setae pectinate. Apodemes similar to larva except upper apodemes of leg IV fused at tip with lower apodemes of leg III. Legs I, II and III similar to female but with the absence of setae on trochanters and the absence of solenidion ω_3 on tarsus I. Leg IV without femoral setae, tibial setae, tibial solenidia and tarsal setae *s* and *f*. Genital primordia between coxal fields IV.

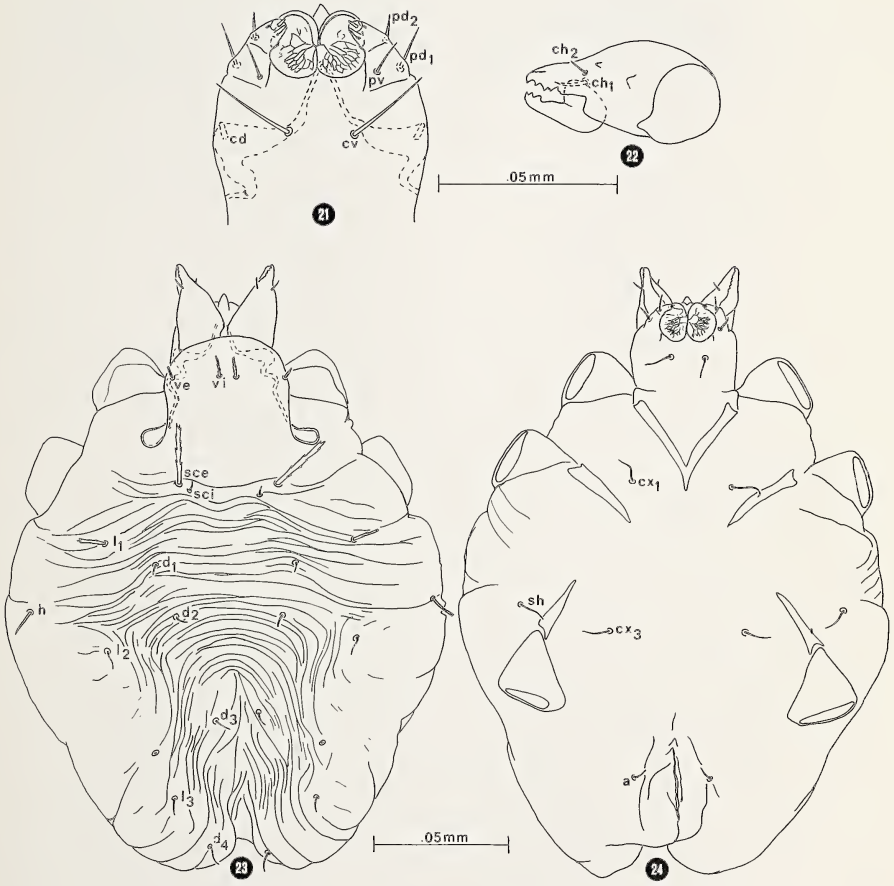
Description of Tritonymph (Figs. 27-28) (n = 10). Idiosomal length 322 (284-375); width at level of seta *sh* 249 (216-280). Idiosoma ovoid with dorsal striations similar to larva. Dorsum bearing 15 pairs of setae: *v i* 15 (14-18), *v e* 6 (6-7), *sc e* 62 (52-71), *sc i 4 (3-6), h* 26 (20-36), 1_1 40 (37-48), 1_2 17 (12-23), 1_3 12 (8-15), 1_4 8 (6-13), 1_5 279 (252-326), d_1 4 (3-6), d_2 6 (4-8), d_3 7 (5-8), d_4 6 (4-7) and d_5 6 (4-7). Setae similar in appearance to female with the exception that setae d_2, d_3, and d_4 and usually 1_4 are not barbed (both setae 1_4 barbed on one specimen, only one of pair barbed on one specimen, and both simply bifurcate at tip on one specimen; setae 1_3 not barbed on two specimens and barbed on one seta of pair on one specimen). Venter bearing nine pairs of setae: *sh* 16 (13-22), cx_1 20 (16-25), cx_3 18 (14-22), cx_4 28 (22-43), upper genital setae 7 (7-8), lower genital setae 7 (7-8), upper anal setae 8 (7-9), middle anal setae 8 (6-9) and lower anal setae 7 (6-8). No anal seta pectinate. Apodemes similar to protonymph. Genital primordia between coxal fields IV. Leg chaetotaxy and solenidiotaxy similar to female.

Systematic Position. McDaniel and Baker (1962) described the genus *Mydopholeus* based on a single species (*M. capillus*) collected from the Mexican free-tail bat *Tadarida brasiliensis* (Saussure) near Tamazula, Jalisco, Mexico. *Mydopholeus wrenni* shares with *M. Capillus* the following adult characteristics diagnostic of the genus. Tarsal seta *ba* a strong spine on legs I and II of the female and legs II of the male. Only one solenidion present on genu I. The dorsum of the idiosoma is striated in a characteristic pattern of transverse striations anteriorly and medially and longitudinal and oblique striations laterally. Fifteen pairs of dorsal setae present. The apodemes of legs I and II are fused—apodemes I forming a "V" and apodemes II a "W". Female with a dorsal bursa copulatrix, and the venter of the subcapitulum of both sexes bears a pair of almost circular pseudorutellar processes.

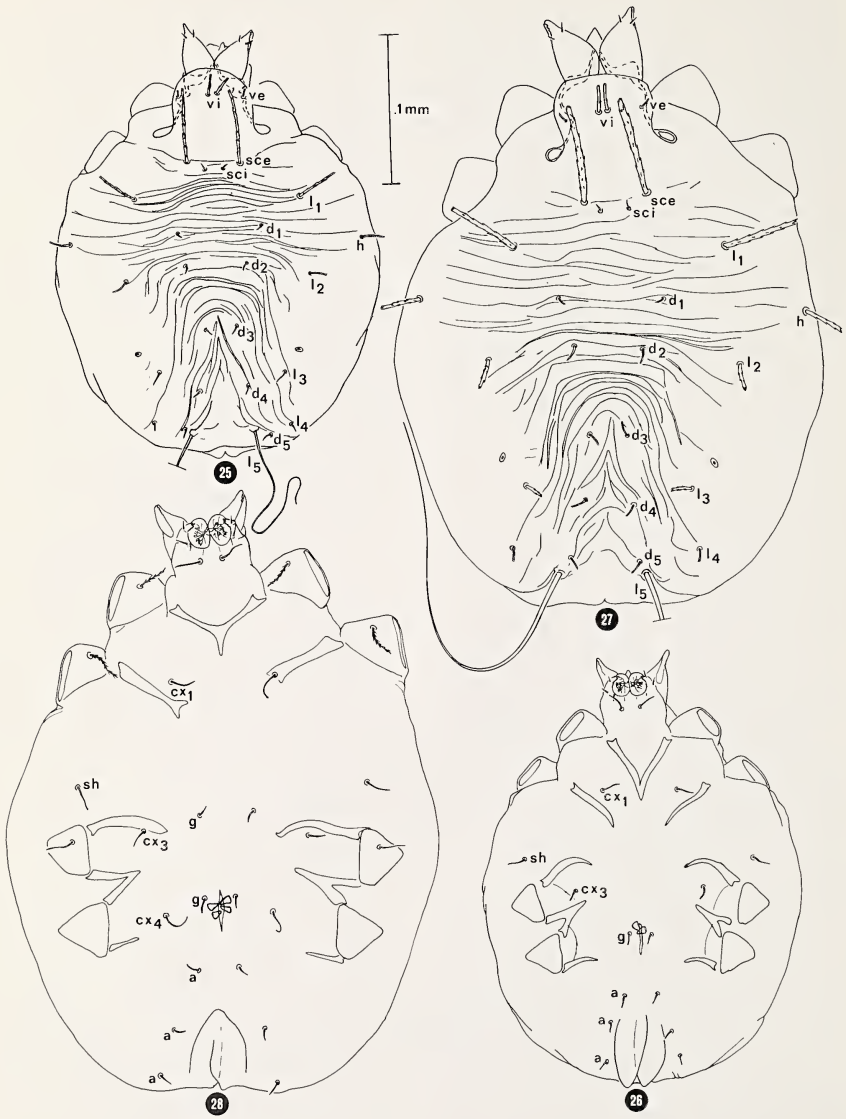
Mydopholeus wrenni differs from *M. capillus* in that dorsal setae d_1 are extremely short, dorsal setae *v e, sc i* and d_1 are not pectinate, some anal setae are pectinate, and supra-coxal setae are lacking.

In 1978 Fain and Flechtmann established a new genus of Rosensteiniidae, *Guanophagoides,* based on a single species (*G. piracicabensis* Fain and Flechtmann) collected from bat guano in Piracicaba, Brazil. Their generic description is, however, consistent with that for *Mydopholeus* in the diagnostic characteristics cited above. Thus I consider *Guanophagoides* a junior synonym of *Mydopholeus* (NEW SYNONOMY). *Mydopholeus wrenni* differs from *M. piracicabensis* (NEW COMBINATION) in that dorsal setae d_1 are short, dorsal setae *v e, sc i* and d_1 are not pectinate, the area around setae d_3 and d_4 is free of striations, some anal setae are pectinate, and setae *sc e* are much shorter (setae *sc e* are 10 to 20 times longer than *sc i* in *M. wrenni,* and only four times longer in *M. piracicabensis*).

Habitat, Collection Locality, and Location of Types. Mydopholeus wrenni was extracted from bat guano collected in Merihew Cave on Old Merihew Ranch; located six miles south, two miles west of Aetna, Woods Co., Oklahoma. Almost all of the bat guano present in Merihew Cave is the product of Mexican freetail bats (*T. brasiliensis*).



FIGS. 21-24. *Mydopholeus wrenni:* 21) female subcapitulum, ventral view, 22) female chelicera, 23) larva, dorsal view, 24) larva, ventral view.



FIGS. 25-28. *Mydopholeus wrenni*: 25) protonymph, dorsal view, 26) protonymph, ventral view, 27) tritonymph, dorsal view, 28) tritonymph, ventral view.

The holotype (female) will be deposited in the National Museum of Natural History, Washington, D.C., along with paratypes. Paratypes will also be deposited in the Acarology Laboratory, Ohio State University, Columbus, Ohio, and the Laboratoire de Zoologie Médicale, Institue de Médecine Tropicale, Anvers, Belgium.

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